DOCUMENT RESUME

ED 365 424 PS 021 798

AUTHOR Sigrest, Christine E.
TITLE A Comparison of Cognitive Teaching Stimuli in a First Grade Classroom.
PUB DATE [92]
NOTE 68p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Cognitive Processes; Comparative Analysis; *Concept Formation; *Elementary School Students; Grade 1; *Illustrations; Instructional Effectiveness; Instructional Material Evaluation; Knowledge Level; Learning Activities; *Manipulative Materials; Pictorial Stimuli; Primary Education; Teaching Methods; Three Dimensional Aids; *Verbal Learning

ABSTRACT

A study assessed the effectiveness of three cognitive levels of instruction with first graders--three-dimensional (3-D) instruction using real objects, two-dimensional (2-D) instruction using picture representations, and verbal instruction. The study population included 18 first-grade students between the ages of 6 and 8 at a small elementary city school in Virginia. The children were randomly assigned to one of the three instructional conditions and taught about three exotic fruits. The 3-D group was taught using the real fruit in an active, hands-on, experiential manner. The 2-D group was taught using life-size drawings of the fruit on construction paper with the name of the fruit printed at the bottom of the page. The verbal group was taught with words. Pre- and post-test data were collected via self-evaluations of the children's knowledge about the fruit and how well they thought they could draw them, children's pictorial representations of the fruit, and oral tests of children's concepts of the fruit. The 3-D group did achieve higher results than the 2-D and verbal groups. The report includes a literature review, personal observations, and 19 references. The lesson plan and outlines of the pre- and post-test formats are appended. (AC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED 365 424

A Comparison of Cognitive Teaching Stimuli in a First Grade Classroom

Christine E. Sigrest

Curry School of Education

University of Virginia

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Christine Elizabeth Sigrest

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Running head: DIFFERENCES OF COGNITIVE TEACHING STIMULI

PS 021798

BEST COPY AVAILABLE

ABSTRACT

This pilot study was conducted to examine three cognitive levels of instruction: Three-dimensional (3-D); two-dimensional (2-D); and verbal. It was hypothesized that the participants in the 3-D manipulation would have the highest rate of achievement of the three groups.

A lesson was taught to all three manipulation groups based on three exotic fruit: Kumquat; cherimoya; and, cactus pear. The 3-D group was taught using the actual fruit in an active, hands-on, experiential manner. The 2-D groups was taught with the use of drawings. Finally, the verbal group was only taught with words.

Data was collect in three forms: Self-evaluation; pictorial representations; and, oral concept discussion. Analysis of the data shows that the 3-D manipulation did in fact achieve the highest results when compared to the 2-D and verbal manipulations.

ACKNOWLEDGMENTS

This work was funded through the generous contributions of my parents, Bill and Gretchen May. Their love and support throughout the culmination of this five year endeavor is gratefully appreciated.

In addition, I would like to thank my University Supervisor, Marti Owens and my Cooperating Teacher, Nina Ozbey for lending their guidance, knowledge and enthusiasm for this research, and making it an enjoyable experience.

Most especially, I give my deepest gratitude to my husband, M. Wren Sigrest, who gave me the strength and the courage to help me realize my dreams and follow my heart.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION 1

Forward

Person as Instrument Statement 1

Purpose (Why?) 2

Final Question 5

Overview 5

CHAPTER 2

LITERATURE REVIEW 6

Philosophies of Learning 6

Child Development and Learning 7

Research 9

Other Considerations

Children of Poverty 11

Pulling It All Together 12

CHAPTER 3

DESIGN OF STUDY, DATA COLLECTION PROCEDURES

AND ANALYTIC METHODOLOGY 14

Design of Study 14

Demographics 14

Entry and Access 14

Participants 14

Setting 15

Materials 16

Data Collection Procedures 18
Duration/Organization of Study 19
Analytic Methods 23
Procedures Used to Analyze the Data 23
Self-evaluation 23
Pictorial Representation 24
Oral Test of Concept 24
Issues of Credibility and Dependability 25
Credibility 25
Dependability 26
CHAPTER 4
FINDINGS (ANALYSIS) 27
Results 27
Self-Evaluation 27
Pictorial Representations 29
Verbal 30
2-D 31
3-D 32
Oral Test of Concepts of Three Fruit 34
Integration of the Results with the Literature 36
CHAPTER 5
CONCLUSIONS 40
Implications 40
My Point of View 41
Future Research 42
REFERENCES 44
APPENDIX A
PRETEST DATA SHEET 47

APPENDIX B

POSTTEST DATA SHEET 49

APPENDIX C

FACES DATA SHEET 51

APPENDIX D

LESSON PLAN 52

APPENDIX E

OUTLINE OF PRETEST FORMAT 56

APPENDIX F

OUTLINE OF POSTTEST FORMAT 58

LIST OF FIGURES

Figure 4-1. Response Frequency for Self-Evaluation..... 28

Figure 4-2. Results of Self-Evaluation..... 29

Figure 4-3. Data for Verbal Post-test Pictures. 30

Figure 4-4. Data for 2-D Post-test Pictures..... 31

Figure 4-5. Data for 3-D Post-test Pictures..... 32

Figure 4-6. Percentage of Correct Responses for each Fruit..... 33

Figure 4-7. Average Per Child Percentage of Correct Responses. 34

CHAPTER 1: INTRODUCTION

Forward: Person as Instrument Statement

Everyone sees the world in their own way, and past experiences are usually incorporated with the present. Additionally, we all hold philosophies that naturally tend to bias the way we view the world and our role in it. It comes as no surprise that I am the sole instrument through which all information, research and data was collected for this project. Though I have tried my best to be objective and unbiased, it is inevitable that my personal philosophy of teaching will surface. With this premise, I feel I should share with the reader my philosophy of teaching so that any potential biases I have held will be understood and known.

I hold the philosophy that math and science can capture a child's interest through use of creative, hands-on activities. In basic mathematics, it is my conviction that problem solving is the single most important skill for a child. Inherent in problem solving is the ability of a child to synthesize knowledge, skills and understanding in order to answer questions, solve problems or achieve goals. Additionally, I feel that science education should carry these same basic attitudes. In particular, I have found that hands-on experiences harness a child's imagination and enable him/her to question and discover though discrepant events.

In the reading arena, I hold the belief that children should not only be taught the skills of reading, but also discover the joys of literature. The Whole Language

and Language Experience Approach methods go the extra mile to achieve this goal.

In general, I believe children are naturally active learners, and they must be engaged both intellectually and physically to reach their full potential. The best way to meet these needs is through hands-on manipulation and learning with actual objects of study.

Purpose (Why?)

The idea for this study was derived from my student teaching experience in the fall semester of 1992 in a first grade classroom at Jefferson Elementary in Cloverdale, Virginia.

I was teaching a two week unit on the four food groups to a class of eighteen first graders. The entire unit was designed to engage students through active learning and manipulation of the different food stuffs. We had all kinds of lessons centered around working with the actual foods in the different food groups, such as making: Fruit salad; biscuits; butter; and the like.

As a review, before the final assessment day, an activity was designed to pull together all the different food groups for the children. The students worked in their cooperative learning groups with four to five members in each group. Each group had a blue "fishing pond" and a "fishing pole" with a bright pink line supporting a magnet instead of the traditional hook.

In the fishing pond were many different food items. They were made out of

construction paper and designed to look as close as possible to the actual food item. Each piece was laminated for durability, and had a metal paper clip attached to it. The idea was for students to "fish" with the pole in the pond for a food item.

When the student "caught" a piece of food, they classified it in one of the four food groups. To do this, they had a large posterboard chart, like the one below. The idea was to work together as a group, taking turns, checking each other as a culminating review activity for the unit on food groups.

After this lesson, I sat down with my University Supervisor and Clinical Instructor to talk about how it went. It was here that my interest in this project was sparked. Both observing parties liked the lesson and thought it went well. Then, my University Supervisor raised an interesting point. He suggested that although the construction paper replications of the foods worked, it would have been ideal to use the real food items instead.

My University Supervisor's primary field is psychology, and this really guided his comments and suggestions about my lessons and teaching. He said that as I had my lesson designed then, the children were only seeing two dimensional representations of the food groups. The best thing to do would be to use the real food items, and have the children "fish" them out of the "pond," and then place the items on the large chart.

Use of the actual food items would be three dimensional rather than two dimensional, and therefore more concrete. Inherently, being more concrete, makes

it easier for the child to experience and understand, and consequently a superior method of instruction for this lesson.

The main reason I did not use the real food for this particular culminating activity was because of the cost. I had already spent in excess of $50 for the unit, and I could not afford to purchase all of the real foods for the charts for all four groups. It made sense that a more economical way to do it was with the two dimensional representations. On the other hand, it also makes sense that the real, three dimensional objects would be superior to use than mere pictures. Of course, it seemed to follow naturally that the two dimensional representations were not the absolute worst method. Logically, mere words would be the most abstract, and least accessible method of representing the foods for the children to grasp; and hence was born my field project.

This study should be important to a variety of people. Most obviously, teachers themselves, especially primary teachers should be interested in the results of this pilot project. Foremost at stake is the issue of the best cognitive style to employ when teaching our primary students. Secondly, teachers should be concerned as to who is going to pick up this tab should it prove to be costly. On this note, administrators and bureaucrats should be particularly interested, since they will eventually be asked for the money to fund this method.

Final Question

The final question was: "Which is the best cognitive method to use when teaching first graders: Three dimensional (real objects); two dimensional (picture representations); or, verbal?" The hypothesis is that the three dimensional real objects will be most beneficial to the learning of first graders, and this leads to the question for future research: "What are the economic implications to the classroom teacher?"

Overview

The second chapter is a review of the literature surrounding the issues of three-dimensional, hands-on, active and experiential methods of instruction. Chapter 3 examines the design of the study, data collections procedures and analytic methodology. In chapter 4 the findings of the study are presented. The results are listed as well as reintegrated with the literature review. Finally, chapter 5 looks at the implications of the study as well as the conclusions of the author and future directions of continued research.

CHAPTER 2: LITERATURE REVIEW

Philosophies of Learning

There are many different philosophies pertaining to education which are relative to the study at hand. Page (1990) reviewed the beliefs of several different philosophers and investigated their educational beliefs and views of hands-on experiential education.

Jean Jacques Rousseau believed that children learned naturally through their senses. He viewed the act of doing as the way children learned and acquired knowledge. Rousseau believed that through performing an action, experience was gained; and, hence knowledge (cited in Page, 1990).

Johann Heinrich Pestalozzi rejected the traditional view of education, and firmly believed in the child as an active learner. He believed, "The teacher's job...was to provide the right environment and to guide the student's use of, and experience with, materials and objects while allowing the student to learn and discover by himself" (cited in Page, 1990, p. 15). Pestalozzi felt that passive learning of students was an ill in society. He emphasized, as did Rousseau, learning by doing through manipulations of objects in the environment. Experience and discovery were the keys to knowledge (cited in Page, 1990).

John Dewey shared the same fear of passive learning as did Pestalozzi. He valued the interactive relationship between children and their environment as the

manner in which learning occurred. Dewey believed that active participation led to learning by doing, and thus a hands-on approach to education was essential (cited in Page, 1990).

William Heard Kilpatrick held the theory that, "...students learned best through activities rather than as passive receivers" (cited in Page, 1990, p. 23). He, "...theorized that learning increased in direct proportion to the wholeheartedness of the student's purpose and involvement" (cited in Page, 1990, p. 24) in the knowledge acquisition process.

Child Development and Learning

Child development plays a crucial role in the field of education. Jean Piaget is at the forefront of theories in the development of children and how they learn. Piaget developed different levels to represent the various stages of intellectual development in children (Renner, Stafford, Lawson, McKinnon, Friot, and Kellogg 1976). Children are usually in Piaget's concrete operational stage of development during the first grade (Biehler & Snowman, 1990). During the stage of concrete operations, a child is, "Capable of operations, but solves problems by generalizing from concrete experiences" (Biehler & Snowman, 1990, p.63). In addition, the child is, "Not able to manipulate conditions mentally unless they [the conditions] have been experienced" (Biehler & Snowman, 1990, p.63).

Piaget also believed there were two kinds of experience that lead to learning.

For young children, and into adolescence, Piaget said learning was termed "physical" (Renner et al., 1976). This type of learning was the result of the interaction and manipulation of the child and his/her environment. At the concrete level of intellectual development, this is the method through which a child learns. "Fundamental structures are probably best constructed, where possible, through physical experience in which information is obtained from objects themselves" (Renner et al., 1976, p. 15).

Because children in the first grade are in the concrete operational stage of development, they learn through concrete experiences. One way to achieve learning from concrete experiences is through use of hands-on experiences in the classroom (Day & Drake, 1986). Activities such as cooking "...can engage children in experiences that allow them to use their hands, eyes, ears, and minds. Through them children learn about themselves and the world around them" (Day & Drake, 1986, p. 26).

Inagaki (1992) further highlights the significance of Piagetian concepts when discussing alternate methods of teaching. He said, "Instead of the traditional method of teachers' transmitting correct concepts, it is recommended that children act on objects or handle materials" (Inagaki, 1992, p. 118). This was referred to as "an active method" of teaching, designed to work in conjunction with the concrete operational stage of development in children (Inagaki, 1992).

Active and hands-on methods of learning were not only advocated by

Piaget, but also by some of the post-Piagetian psychologists. Post-Piagetians believed in having children experiment and manipulate objects in the physical world to construct knowledge by themselves (Inagaki, 1992).

The role of experience is even evident in the early stages of infancy (Bertenthal & Campos, 1987). Infants are predisposed to have the superior method of learning be through experiences in their environment (Bertenthal & Campos, 1987).

Research

There is considerable evidence to support theories concerning the importance of hands-on manipulations of objects as a facilitator of learning in children. Because experiential learning is relative to all aspects of knowledge acquisition, the research also spans across the various disciplines.

Pramling (1989) investigated the role of experience for children in learning about economic concepts. She believes that in order to teach a concept such as traffic, a child must actually experience traffic. The same holds true for teaching children about economics; let them experience various realms of economics to learn their functions. For example, if children use manipulatives in a "store" in their classroom, they will, "begin to realize that there is a relation between the customer's money and the money with which the shop has to pay for the articles delivered" (Pramling, 1989, p. 153).

The conclusion of the study by Pramling (1989) is that education, "...ought to be a question of developing the child's understanding of the world around him or her, that is, an experientially oriented education" (Pramling, 1989, p. 163). By engaging students in activities designed to promote experiential learning, children become active participants in the educational process.

In another study examining the role of real-life experiences in economic education of young children, Laney (1989) came to the conclusion that, "...real-life experiences...enhance first graders' learning and retention of the economic concept of opportunity cost" (Laney, 1989, p. 235). One thought behind this result stems from Kourilsky's belief (cited in Laney, 1989) that real-life experiences hold more meaning to the students because they are more familiar, and therefore they are able to better relate to the concept (Laney, 1989).

The role of hands-on learning has also been applied to the enhancement of literature and the acquisition of language as seen in Worden and Franklin (1987), Stomfay and Aline (1991), Abdul and Shoatz (1991), and Williams and Kamii (1986).

Abdul and Shoatz (1991) believed that one of the ways in which children learn is through experimentation. Williams and Kamii (1986) took this a step further in applying it to the necessity of hands-on activities to extend the development of language skills in the classroom.

Stomfay and Aline (1991) examined the significance of a multisensory

approach to enhancing literature for young children. They advocated the use of the five senses through active learning and object manipulation. Stomfay and Aline (1991) provided examples such as when teachers use support materials in conjunction with a story. Sometimes teachers dress-up to imitate a character or they have the children perform an activity depicted in the story.

Finally, in an article by Petty (1988) the issue of three-dimensional real-life art work was raised. The need for concrete experiences is related to the discipline of art when Petty says, "It is precisely the very young students who needs the three-dimensional art experiences before beginning the two-dimensional" (Petty, 1988, p. 32). She went on to say that this idea extends to other fields of knowledge for children, such as science education.

Other Considerations: Children of Poverty

Another consideration relative to the importance of real-life experiential learning is the base knowledge that children bring with them to the classroom. In Maria (1989) it is pointed out that children come to school with different levels of knowledge and experiences. Many of the children of poverty lack real-life experiences from which to have a base of knowledge. It is this concern that makes real-life experiential learning even more critical for the child because, "After all, you can't brainstorm about something you know nothing about" (Maria, 1989, p. 297).

Cooper (cited in Maria, 1989) said that direct experience is the answer to the

problem of poverty children. However, he questioned the feasibility of this solution in the traditional educational classroom (cited in Maria, 1989).

In an article by Johnson (1991) the relationship between children of poverty and the absence of experiential knowledge was again examined. She said, "...they need learning experiences that will help them to draw on their everyday experience to connect and to construct meaning..." (Johnson, 1991, p. 174). Johnson (1991) reminds us that there is an enormous gap for children of poverty between the home, the school and the outside world. Experiential learning using hands-on procedures can help to close the gap for these children. "Children living in poverty need classroom learning experiences that are varied, interesting and opens them to wider possibilities" (Johnson, 1991, p. 176).

Pulling It All Together

In summary, Cowles and Aldridge (1992) state that:

> Children learn by doing. Children learn through active participation and involvement. Exploring the environment, using manipulative materials, experiencing concrete, hands-on activities through individual participation and social interaction are ways that young children coordinate relationships and construct their own knowledge. (p. 7)

They also made reference to Piaget's theory of intellectual development. "Children learn from the concrete to the semiconcrete to the abstract" (Cowles & Aldridge, 1992, p. 7).

For example, to teach a child about oranges on a concrete level, he/she would first experiment with an actual orange. The child could use all of their senses with the orange. Then the child could move to a semiconcrete experience with pictures of oranges in books or by drawing an orange for his/her self. Finally, the abstract phase of the orange would be reading the word, or having someone read to him/her about an orange (Cowles & Aldridge, 1992). "In activity-oriented classrooms children have opportunities to explore the environment at a concrete level before moving on to semiconcrete and abstract representations of concepts" (Cowles & Aldridge, 1992, p. 8).

Yerkes (1988) also supports the use of experiential activities to foster learning in the classroom. The children view hands-on learning as a kind of play, very different than learning from text books (Yerkes, 1988). Likewise, LeBox (cited in Wassermann, 1990) said, "...learning at its best is experiential and child-centered" (p.250).

CHAPTER 3: DESIGN OF STUDY, DATA COLLECTION PROCEDURES AND ANALYTIC METHODOLOGY

Design of Study

Demographics

This pilot study took place in a small elementary city school in Cloverdale, Virginia (population 40,000). There are approximately 4,500 students in the city school system overall, and about 270 students in this particular elementary school. The school accommodates kindergarten through fourth grade within its setting.

Entry and Access

Entry and access in and out of the school was arranged through the classroom teacher, Ms. O. There were no problems as to when I could reach the students, as the cooperating teacher Ms. O was more than flexible and willing to adjust her schedule to help meet all of the needs of the study.

Participants

The class that participated in this study is very heterogeneous, because there are children from very professional University families, as well as children from blue collar families in the Charlottesville Loverdale projects area.

There are twenty children in this first grade classroom; however, only eighteen of the students were participants in this pilot study. The students range in age from six to eight years old. There are six girls and fourteen boys in the class.

Ethnically, there are eleven Caucasian children, seven African-American children, one Russian child and one Hispanic child.

Two boys did not participate in the study. One of the boys was absent during all three of the experimental teaching days. The other boy is from Russia, and does not speak, read or write any English.

There are five students who are on the free lunch program, and they usually come to school with no breakfast. These five children are the lowest in the class in vocabulary and reading. They crave attention, and react very well when they are rewarded with praise.

About half of the students come from two parent homes. One child has parents who just separated this summer. There are a handful of children who live with their grandparents rather than their parents. The other children live in single family homes. There are a couple of students who have mothers that have to go to the battered wives' shelter due to abuse from the husband.

There is a high amount of parental support for Ms. O, with a different parent coming in each day for about an hour to work on dictation's and reading with the children on a one-on-one basis.

Setting

Lessons were taught in the hallway outside of the traditional closed-in classroom. There was a little nook in the hallway under a window with a table, two chairs and an easel available for use. The furniture was manipulated to that the

students were able to sit in a semi-circle on the floor around me. Sometimes there were slight interruptions due to the noise of classes walking through the hallway.

Materials

There were a variety of materials needed to implement this pilot study. Starting with the three dimensional experimental group (3-D group), a variety of exotic fruit were needed for the lesson. This included: Kumquats; cherimoyas; and, cactus pears. There were seven kumquats used; one for each child in the group and one to be used as a model by me. In addition, four cherimoyas and four cactus pears were needed. This was to enable the children to share each fruit in groups of two during the lesson, and one for me to use as a model.

It was also necessary to have a large roll of super absorbent paper towels, plastic spoons and knives, a sponge and a few large plastic trash bags to use as "easy to clean" surfaces.

Materials for the two dimensional experimental group (2-D group) consisted of three drawings. These drawing were on white 6 inch by 8 inch construction paper with the horizontal axis being the latter. The name of the fruit was printed by hand in black permanent marker below the fruit 1 inch up from the bottom of the paper. The fruits were drawn by hand using colored pencils and crayons. They were made to resemble as closely as possible the actual fruit both in appearance, shape, color and size. All three of the picture cards were laminated to increase longevity.

All that was required by the verbal experimental group was a large 24 inch by 32 inch lined pad of paper and black permanent marker. There was also an easel with two clips used to support and display the pad of paper. These materials were also used by the 3-D and 2-D experimental groups.

The pretest procedure required the use of a box of 24 color Crayola crayons and a data test sheet (see Appendix A). The data test sheet was a white 8 1/2 inch by 11 inch paper. It was divided into eight equal boxes. Each box was numbered, starting with the top left hand box as "1" and going down the first column. The second column started in the upper right hand corner of the paper as "5" and carried through the eighth block.

The posttest also required the use of the crayons and a data test sheet. It was on the same size and color paper, but it was only divided into four equal boxes (see Appendix B). Each of the boxes was labeled with a number in the same manner as described above. During the posttest a mini tape recorder was used to record the responses of the students.

In both the pretest and the posttest a "Faces" data sheet was used (see Appendix C). It was a small strip of three faces: Smiley; straight; and, frownie. Sheets of colorful stickers were also on hand during both testing procedures, and given to the students as a reward at the conclusion of the testing before they returned to the classroom.

Data Collection Procedures

To determine which of the three teaching methods (3-D, 2-D, or verbal) worked best for the first grade students I collected the data using the following methods:

- Chose the subject of the study- exotic fruit
- Chose the students
- Designed three lessons with one using verbal stimuli only, another using 2-D Stimuli methods only, and a third using 3-D stimuli

The first step was to determine what subject I was going to teach for this study. It had to be something that the students had not been taught yet in order to avoid contamination from past experiences. The subject also needed to be something age appropriate for a first grader. Additionally, it would have to be a topic which allowed for the ease of the three different variable manipulations. After careful thought, I decided that exotic fruit would be a good subject to use for this study. With the screening of the pretest, it allowed for all of the requirements I demanded above.

Students were randomly assigned to one of three conditions: Three dimensional (real objects); two dimensional (pictorial representations); and, verbal only. Names were written on equally sized pieces of paper and then drawn out of a hat and put into one of three columns sequentially which were labeled "A," "B," and "C." Then, the three conditions were written on equally sized pieces of paper,

and drawn out of the hat, and assigned in order of drawing to each of the columns.

A lesson plan was then designed to be followed with all three groups (see appendix D). The only variation between the conditions was the addition of pictures in the 2-D manipulation and the inclusion of the actual fruits in the 3-D manipulation.

A pretest was individually conducted with each child in order to select three fruit that were not known by the students. Students were tested on a total of eight exotic fruit (See Appendix E).

A post test procedure was individually conducted with each child to assess their knowledge and understanding of the material (See Appendix F).

Duration/Organization of Study

The entire study would take a five day period of time. The five days were to be sequential to eliminate negative effects from time lapses. The sequence was as follows:

Day One: This day was Wednesday February 16, 1993. It was preferable not to have it be on a Friday so that the students would not be overly excited about the pending weekend. The purpose of the first day was to observe the behavior of the students, and take not of the events in the classroom. This was to be used as a baseline for behavior.

Day Two: This was the day to administer the pretest to all of the students. The test was given to the students individually, and ten minutes was allowed for each child.

This required that I have a consecutive three hour block of time on a day that was preferable not a Friday or a Monday to avoid the effects of the weekend. The actual day chosen was Thursday, February 17, 1993.

The format of the pretest was the same for all students (see outline in Appendix E). There were two activities during the pretest. The first was drawing eight pictures of fruit. I would say the name, and the child would draw the picture. It started with a model to ensure the children understood what they were to do, as well as to serve as a positive experience.

The purpose of this part of the pretest was to see prior experience any student may have had with seven different exotic fruit. I wanted to make sure the fruits I chose for the lessons were not known by any of the students. The only fruit that was known by some of the children was a pomegranate, so it was discarded. The three fruit I chose to use in the lessons were selected randomly; they were: Kumquat; cherimoya; and, cactus pear.

The second part of the pretest was a form of self-evaluation. The child was given the faces strip, and was asked to follow directions. I covered my eyes. First, the child was instructed to use a blue crayon to circle the face the showed, "How much you [they] knew about the fruits they just drew." Then the child was instructed to take a red crayon and circle the face that showed, "How good you [they] will be able to draw the fruit after we learn about them." Then the child was told to hide the paper in a pile of other papers. When they were done, they told me,

and I uncovered my eyes.

This part of the pretest was to serve two functions. The first was simply to get the student used to this method of evaluation, because I wanted to use it for the posttest, and I did not want it to be unfamiliar to them. Secondly, I was interested in how well the students actually thought they drew the fruit.

Each strip had a very faint number on the back of it in pencil. Each child had a number, and with this system in conjunction with the closing of my eyes, no name on the strip and the child hiding it in the pile, anonymity appeared to be protected. This was done to enhance the honesty of responses from the students.

The face that was circled with the red crayon was disregarded. The point behind this was to give the student a chance to circle a smiley face for themselves. It was possible that some of the students would circle the frownie face for themselves during self-evaluation. Ending on such a negative experience might be upsetting to the child, and thus I hoped to provide a positive experience on which to leave the pretest.

Day Three: The Experimental Lesson: Twenty minutes were allowed to teach the lesson, and approximately ten minutes for each child individually to complete the posttest. This means that at least one hour of time was needed to finish the procedure. It was preferable that this time be the same for all three teaching days to avoid any bias in the testing procedure. Permission was given to teach for three consecutive days from 9:45 a.m until 11:15 a.m.

Additionally, it was preferable for the first day not to be a Monday, which is usually an adjustment day for the school week. The day chosen was Tuesday, February 23, 1993.

One final consideration was made pertaining to the order in which the three manipulations were taught: Verbal; 2-D pictorial representations; and, finally 3-D real objects. This was decided in order to avoid any possible contamination from communication between the students during lag times. It was assumed that there would be less to talk about, and potentially happen to see in the verbal condition, and therefore it was better suited to start with teaching on the first day. The same logic applied to the decision to teach the 2-D manipulation on the second day.

A final benefit to teaching the 3-D manipulation on the last day was the consideration of bring the other two groups together after it was all over to let them have the same experiences with the fruit as did the 3-D group. I wanted all of the students to learn about these fruit, and have the enjoyment of tasting, seeing, feeling, and smelling the fruits for real. It was very easy to do this after finishing the 3-D group, because all of the work area was set up, and it was not difficult to bring in extras.

The first thing I did on this day was to teach the lesson (see Appendix D). Then, I administered the posttest to the six students individually. The posttest procedure was identical for all three of the groups (see Appendix F).

Day Four: The Two-Dimensional Lesson: This lesson took place on Wednesday,

February 24, 1993. The students were tested and taught at the exact time of day as was the previous group. The presentation of the lesson and the posttest administration were identical except for the addition of the pictures of the fruit.

Day Five: The Three-Dimensional Lesson: This lesson took place on Thursday February 25, 1993. The students were tested and taught at the exact time of day as were both of the previous groups. The presentation of the lesson and the posttest administration were identical except for the addition of the actual fruit objects.

Analytic Methods

Procedures Used to Analyze the Data

Data was analyzed according to the type of information it contained. In this study there were three types of data: Self-evaluation; pictorial representation; and, oral test of concept.

Self-evaluation

The self-evaluation procedure consisted of the faces sheet given to the students (see Appendix C). Results were analyzed by assigning numerical values to each of the three face. The smiley face received the highest number of points because it is the most desirable of the three. In each of the three groups (3-D. 2-D, and verbal) weighted averages were then computed for frequencies of each of the three faces chosen by the participants. From these averages, a bar graph was constructed to visually relay the results.

Pictorial Representation

A second means of data collection was through the participants pictorial representations of the three fruit. Grading criteria were established for the evaluation of the pictures. The criteria consisted of color, shape and size. Each of these three characteristics were either given a value of "0" or "1" on a chart to keep the data organized (see chapter 5: Findings). A score of "0" indicated that the depiction of the characteristic was erroneous. A score of "1" was indicative of a correct depiction of the characteristic.

The following was computed for each of the three groups (3-D, 2-D, and verbal): An average of the correct responses per child was calculated and divided by the total possible correct answers per child to obtain an average correctness percentage. In addition, for each fruit, a correctness percentage was calculated by dividing the total number of correct responses in all three characteristics (color, shape, and size) by the total number possible (3 x 6 = 18).

Oral Test of Concept

A final method of data collection was through the hypothetical story told to the participants test their concepts of the fruit beyond their visual representations. Tape recordings were made of all of the responses to the questions in this section, and then they were listened to and transcribed to ease in evaluation.

After careful pouring over the transcripts for days, three points of interest came to the surface. The first was the phrase, "I don't know." This was counted

for frequencies as a response in all three groups.

The second aspect of the transcripts investigated was the use of a questioning voice inflection at the end of a statement. This was represented with a "?" at every point of occurrence in the tapes. The "?'s" were then counted up for each of the three groups (3-D, 2-D, and verbal).

The final aspect of the tapes to be analyzed were the actual vocabulary descriptors used by the students. Examples of their actual words were given for poignancy.

Issues of Credibility and Dependability

Credibility

Attempts were made to protect the credibility of the present study. There were three different forms of data collected form each subject in order to provide alternate forms of comparison and support for each other. These three forms of data collection were: Self-evaluation; pictorial representation; and, oral test of concept.

A weakness of the study is in the area of length of observation. Due to the nature of the project, there was not time for lengthy observation of the participants. Additionally, time was not allotted for lengthy engagement and interaction with the subjects. One positive point of contingency lies in the fact that my student teaching was in this classroom for approximately eight weeks during the fall semester of

1992. However, there was a three month lag period between the weeks of student teaching and the beginning of the testing time in the classroom.

Dependability

This study has dependability in that it was carefully and methodically performed. Consistent and highly accurate attempts were made to take careful notes and reports of all aspects of the study. Details were recorded to an extreme and care was taken throughout the entire study.

Weakness of the study lie primarily in the area of internal and external validity. Concerning external validity, it would be very hard to generalize the results of this study to any population other than this one particular classroom studied in this one particular school in this one particular city.

Looking at internal validity, this study can never be any more than a pilot study. There were not enough subjects run to be able to perform analytic procedures other than simple averages. Also, it was impossible to control all variables for consistency other than the three manipulation variables.

CHAPTER 4: FINDINGS (ANALYSIS)

Results

The question remains as to which of the three cognitive teaching methods produces the best results for the students. It is hypothesized that the experiential 3-D method will produce the greatest learning in the children. The results of the post-test will be analyzed in three separate units: Self-evaluation; scoring of the pictures; and tape recordings of the responses to the hypothetical situation.

Self-Evaluation

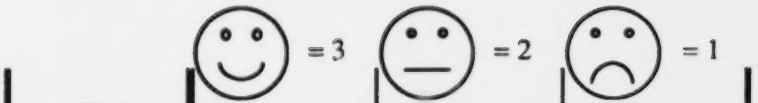
This section presents the results of the self-evaluation. Figure 4-1 shows the data of the self-evaluation measure. Values were assigned to each of the faces:

Smiley face = 3

Straight face = 2

Frownie face = 1

where the highest value was assigned to the smiley face since it was the most desirable of the three ratings.



Test			
Verbal	1	3	2
2-D	3	2	1
3-D	6	0	0

Figure 4-1. Response Frequency for Self-Evaluation.

A simple weighted average of the frequencies for each evaluation yields the following results:

$$\text{Verbal:} \quad \frac{1(3) + 3(2) + 2(1)}{6} = \frac{11}{6} = 1.83$$

$$2-\text{D:} \quad \frac{3(3) + 2(2) + 1(1)}{6} = \frac{14}{6} = 2.33$$

$$3-\text{D:} \quad \frac{6(3) + 0(2) + 0(1)}{6} = \frac{18}{6} = 3.00$$

These are presented in the bar-graph of Figure 4-2.

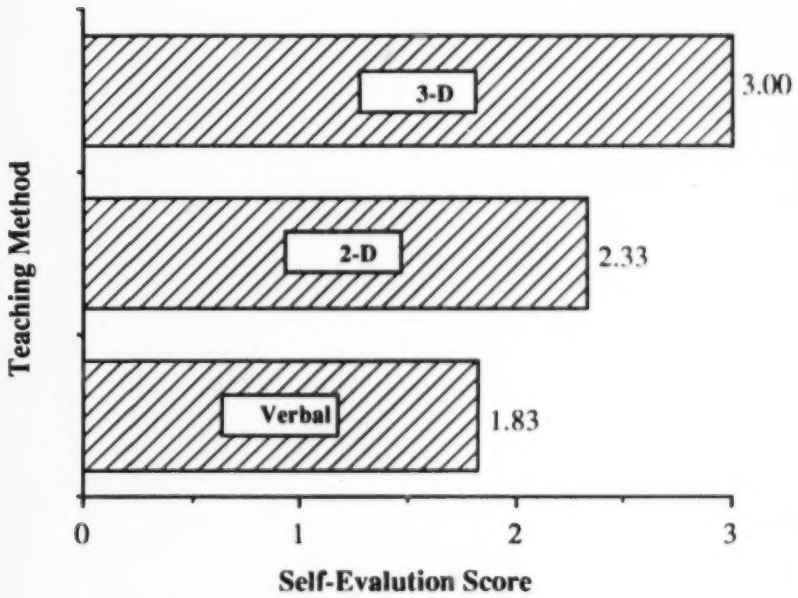


Figure 4-2. Results of Self-Evaluation.

Pictorial Representations

This section presents the accuracy of the fruit drawings. The figures are compilations of the children's scores received for each the fruits. Values of "0" and "1" are assigned to incorrect and correct depiction's, respectively, of three fruit characteristics: Color; shape; and, size. For reading ease, this section is divided into three sub-sections: Verbal; 2-D; and, 3-D.

Verbal

Figure 4-3 shows the results for the verbal group, graded for correctness, of three characteristics for each fruit.

VERBAL

	Kumquat			Cherimoya			Cactus Pear			
Child	Color	Shape	Size	Color	Shape	Size	Color	Shape	Size	Total
1	0	0	0	1	0	0	1	0	0	2
2	0	1	0	0	0	0	0	0	0	1
3	0	1	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	1	0	0	1
5	0	0	0	0	0	0	0	0	0	0
6	0	1	1	0	0	0	0	0	0	2
Total	0	3	1	1	0	0	2	0	0	7

Figure 4-3. Data for Verbal Post-test Pictures.

The percentage of correct responses for each fruit was computed and is shown in the summary graph, Figure 4-6. In addition, the average child percentage of correct responses was calculated, and is shown in Figure 4-7.

Percentage of Correct Responses per Fruit

$$\text{Kumquat} \rightarrow \frac{0+3+1}{18} = \frac{4}{18} = 22\%$$

$$\text{Cherimoya} \rightarrow \frac{1+0+0}{18} = \frac{1}{18} = 5\%$$

$$\text{Cactus Pear} \rightarrow \frac{2+0+0}{18} = \frac{2}{18} = 11\%$$

Average Child Correct Response Percentage

$$\frac{2+1+1+1+2}{6} = \frac{7}{6} = 1.167 \rightarrow \frac{1.167}{9.0} = 13\%$$

2-D

Figure 4-3 shows the results for the 2-D group, graded for correctness, of three characteristics for each fruit.

2-D

	Kumquat			Cherimoya			Cactus Pear			
Child	Color	Shape	Size	Color	Shape	Size	Color	Shape	Size	Total
1	1	1	0	0	0	0	0	0	1	3
2	0	1	0	0	0	0	0	0	0	1
3	1	0	0	0	0	0	0	0	0	1
4	1	0	0	1	0	0	0	1	0	3
5	1	1	1	0	1	0	0	1	1	6
6	1	1	1	0	0	0	0	1	1	5
Total	5	4	2	1	1	0	0	3	3	19

Figure 4-4. Data for 2-D Post-test Pictures.

The same procedure was followed as in the Verbal section to compute the percentages of correct responses. These results are presented in Figures 4-6 and 4-7.

3-D

Figure 4-3 shows the results for the 3-D group, graded for correctness, of three characteristics for each fruit.

3-D

	Kumquat			Cherimoya			Cactus Pear			
Child	Color	Shape	Size	Color	Shape	Size	Color	Shape	Size	Total
1	1	1	0	1	0	0	1	1	0	5
2	1	1	0	1	1	1	1	1	1	8
3	1	1	1	1	1	1	1	1	0	8
4	1	1	1	1	1	0	1	1	0	7
5	1	1	1	1	1	1	1	0	1	8
6	1	1	1	1	1	1	1	1	1	9
Total	6	6	4	6	5	4	6	5	3	45

Figure 4-5. Data for 3-D Post-test Pictures.

The same procedure was followed as in the Verbal section to compute the percentages of correct responses. These results are presented in Figures 4-6 and 4-7.

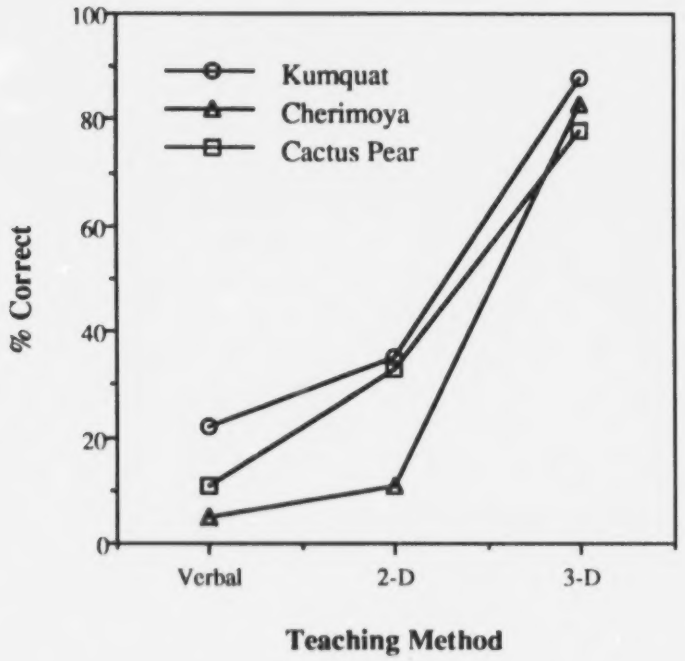


Figure 4-6. Percentage of Correct Responses for each Fruit.

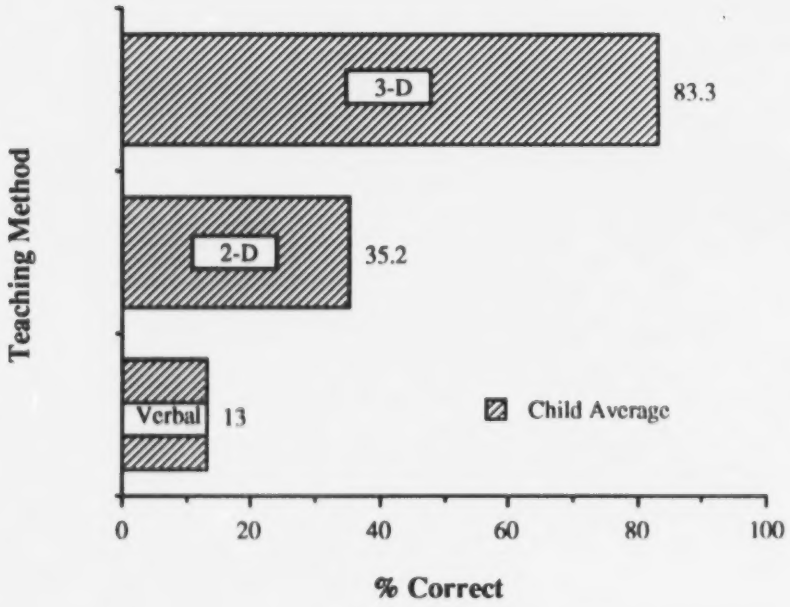


Figure 4-7. Average Per Child Percentage of Correct Responses.

Oral Test of Concepts of Three Fruit

A final method of evaluation was in the hypothetical scenario given to the students where their help with identification of the three fruits were solicited. There was a tape recording made of all of the conversations which were consequently transcribed onto paper.

After careful analysis of the recordings, three interesting points of interest were discovered. The first point of interest lies in the examination of the phrase, "I don't know." This phrase was used more frequently in the verbal and 2-D

groups than in the 3-D group. It appeared in the transcripts a total of 20 times for the verbal group, 19 times for the 2-D group and only one time in the 3-D group. In fact, the only time the phrase, "I don't know" was used in the 3-D group it was in reference to the taste of the cherimoya, and was qualified with the corollary, "I don't know...I didn't want to taste it."

The second point of interest seen in the transcripts addresses the raising of the voice at the end of a statement indicating more of a question than a statement. The frequency of questioning voice inflections at the end of sentences was much higher for the verbal and 2-D groups then for the 3-D group. This questioning tone was noted 38 times in the verbal group, 25 times in the 2-D group and three times in the 3-D group.

Finally, there was an obvious difference in the descriptors given in the children's responses. Students in the 3-D group gave much more vivid descriptions of characteristics such as taste, small and touch. Some examples of descriptors used by the 3-D group are: "A dirty kind of green"; "It smelled like a trash can"; "It felt slimy...*VERY* s-l-i-m-y"; "It smelled like cheeses"; "They taste like coconut and cream"; "It smelled like someone farted"; "It smelled sorta like a yogurt kind of white"; "It had little tiny *itsy bitsy* seeds"; and, "It felt smushy."

Additionally, the children in the 3-D group used words to describe these concepts which were very different descriptors than the generic ones they had

originally been told about the fruit. In the verbal and 2-D groups, the children regurgitated exactly what they had been told about the fruit or gave the response, "I don't know."

Integration of the Results with the Literature

There is considerable evidence from this pilot study to support the results seen in other research studies. These studies were designed to investigate the importance of hands-on manipulations of objects as tools to facilitate learning in children. The pilot study at hand was designed to compare the effectiveness of three tools to facilitate learning in children (verbal, 2-D, 3-D) with the hypothesis being that the 3-D real-life and active hands-on method of teaching will be superior to the other two methods..

Pramling (1989) and Laney (1989) both investigated the importance of real-life experiences in the education of young children in the field of economics. Both studies came to the conclusions that real-life and experientially oriented education are most effective in the child's learning of the concepts in the economic domain.

The results of these two studies are in agreement with the evidence derived from this pilot study. Clear evidence has been given to support the fact that across the board all of the scores for children in the 3-D group are much

higher than those scores obtained for the children in the 2-D and verbal manipulations groups. The average percentage of correct characteristics of the fruit was 83% for the 3-D group, and only 35% and 13% for the 2-D and verbal groups respectively.

The role of hands-on learning was also investigated in the domain of literature (Worden & Franklin 1987, Stomfay & Aline 1991, Abdul & Shoatz 1991, Williams & Kamii 1986). These studies lend credibility to the use of multisensory methods in teaching to enhance literature through active learning and object manipulation (Worden & Franklin 1987, Stomfay & Aline 1991, Abdul & Shoatz 1991, Williams & Kamii 1986).

The results of this pilot study are in agreement with the findings of increased learning and enhancement of subject material through use of hands-on activities and active experimentation (Worden & Franklin 1987, Stomfay & Aline 1991, Abdul & Shoatz 1991, Williams & Kamii 1986). Data clearly indicate that children in the 3-D group scored the highest on all three fruit pictures. Additionally, the children in the 3-D group rated themselves higher (all giving themselves smiley faces) than did the children in the 2-D and verbal groups. Finally, pertinent to the essence of language usage, the students in the 3-D group used more accurate and descriptive words when describing the fruit. They tended to draw upon their own experiences rather than simply regurgitating something I had told them as did the 2-D and verbal groups.

In an article by Petty (1988), issues of the importance of three-dimensional art work for children before graduating to two-dimensional art work were raised. Petty said, "It is precisely the very young students who need the three-dimensional art experiences before beginning the two-dimensional" (p.32). Evidence in agreement with the 3-D versus 2-D argument was found in this pilot study. A quick glance at the figures will visually show the significance of the 3-D aspects over the 2-D and verbal aspects. What is also important is the realization that the hands-on, 3-D real-life experiences applies to other domains of the young child's education in addition to art and the content limitations of this pilot study.

Finally, in the article by Cowles and Aldridge (1992) it was stated that, "Children learn from the concrete to the semiconcrete to the abstract" (p. 7). This pilot study appears to show strong evidence to support that statement. Scores for all three aspects of this pilot study went from high to medium to low when comparing the three groups in order of 3-D, 2-D and verbal respectively.

Even more interesting is the example given in the article by Cowles and Aldridge (1992) as to differences between concrete, semiconcrete and abstract. They actually used as an example three ways one would learn about a piece of fruit. First in a concrete method, the student would be given the actual fruit, and experiment with it through manipulations and the involvement of their five senses. Secondly, the child would move to the semiconcrete phase, and be shown pictures of the fruit. Finally, the child would move to the abstract phase of the

fruit, and examine it as a word comprises of letters as well as orally (Cowles & Aldridge, 1992). This is a similar design to this pilot study, and they provide positive support for one another. It is especially important that the studies were conducted at different places, thus enhancing the credibility of the results.

Recalling the question of which teaching stimuli (verbal, 2-D, or 3-D) is most effective in a first grade classroom, the above data lends support for the superiority of the 3-D hands-on method over the other two methods. This leads to the real-life implications for classroom teachers and the conclusions of this study.

CHAPTER 5: CONCLUSIONS

Implications

The purpose of this pilot study was to examine three cognitive methods of teaching and determine which one is the most appropriate for instruction in a class of first graders. The three methods of instruction varied on a cognitive level from concrete (3-D) to semiconcrete (2-D) to abstract (verbal). It was hypothesized that in the first grade, students are in need of learning in an active, hands-on, experiential and concrete manner. The results of this pilot study lend support to this hypothesis as well as agreement with other research around this topic.

This has strong implications for the field of education, especially if broader and stronger studies like this pilot study are carried through and similar results are obtained. The goal of education is centered around the child. It seems obvious that we, as educators, should strive to meet the educational needs of the children in the best and most optimal way possible. In this light, the results of this pilot study indicate that in the first grade, the most effective way to teach children and the best manner under which they learn is through hands-on, 3-D, active manipulation and experimentation of the objects under study. Should this hold true in future research, there could be serious repercussions in the structure of a first grade classroom.

My Point of View

It has been my experience that many first grade classrooms are filled with expensive books that sit on shelves and collect dust. Then, the teachers go out and spend a considerable portion of their own money to buy materials that are used to teach their children in a hands-on 3-D manner. It seems ironic that teachers are aware of the best way to teach their first graders (as if they have a sixth sense) while the administration and bureaucracy who allocate the moneys lag behind.

Personally, for this one lesson, I spent twenty-five dollars. Might I reemphasize for one lesson! Let's be conservative and suppose that for one discipline (i.e. math) the average hands-on 3-D lesson costs $10. If the subject is taught once a day all week, the cost would reach $50 for the teacher. The cost then jumps to $200 per month and then soars to $1800 for the academic year. Recall that these figures are only for one discipline!

In addition, it was much more exciting for me as a teacher to work with the children with the actual fruit. My enthusiasm for the 3-D method made me excited to share this information with the children, and I am sure they could sense my energy. I feel that this can only help those children want to learn when they see that the teacher wants to learn with them, teach them, and help them learn.

For the children in the 3-D group and myself alike, it was almost like play, active, fun, exciting and pure learning!

When it was all over I gave the children in the 2-D and verbal groups the same opportunity to experience the fruit as did the 3-D group. This proved to be very interesting. All of the children who appeared to be bored in the 2-D and verbal sessions were paying complete attention. They started to say things like, "Oh, this tastes like..." and "Oh, this smells like." It was as if it was all coming together for them and they were finally able to make sense out of everything I had previously only told them about orally or shown them in drawings.

It is my conviction that 3-D , hands-on, active and experiential learning is a critical component of learning in a first grade environment. I have found this to be the case not only in this pilot study, but also during both of my student teaching placements.

Future Research

There are many directions in which this study could continue. First, it would be interesting to see if there are any effects in the retention of the subject material taught using the 3-D group versus the 2-D and verbal groups. One could go back and re-test the children a week later, and then two weeks later and see which of the three groups recalls the most information about the concept. It would be my hypothesis that the 3-D groups would be the strongest in retention,

because the children actually experienced the subject matter. The children in the 2-D and verbal groups would have to rely solely on memory to regurgitate the information since they can not internalize their own experiences with the subject at hand.

Another direction for future research is in the area of the age of the children for whom this is an effective method. I used hands-on 3-D materials when I taught a science unit on energy for third graders. I would hypothesis that children of all ages would benefit from the actual experience of the manipulations of objects. From personal experience, this also seems to be true for adults.

Another area of extended study could be in the area of sex differences. Perhaps this method works better for girls than it does for boys; maybe there is not difference between the two groups.

Finally, it would be wonderful to continue the study with more stringent control over issues of credibility and reliability. I think even more apparent results could be obtained through the running of more informants This is a great pilot study to branch out and take to new heights. In addition, it would be interesting to ties in the monetary aspect of the issue should future results indicate that 3-D hands-on teaching is the best method. As it stands right now, most of the money provided for these materials comes straight out of the pockets of the classroom teachers.

REFERENCES

Abdul, H., & Shoatz, S. (1991). Enhancing oral communication skills of preschool children through partnerships, hands-on experiences and cooperation. Unpublished practicum, Nova University.

American Psychological Association. (1983). Publication manual of the American Psychological Association (3rd ed.). Washington, DC: Author.

Bertenthal, B. I., & Campos, J. J. (1987). New directions in the study of early experience. Child Development, 58(3), 560-567.

Biehler, R. F., & Snowman, J. (1990). Psychology applied to teaching. Princeton, New Jersey: Houghton Mifflin Company.

Cowles, M., & Aldridge, J. (1992). Activity oriented classrooms (Report No. 0352-7-00). Washington, DC: National Education Association.

Day, B., & Drake, K. N. (1986). Developmental and experimental programs: The key to quality education and care of young children. Educational Leadership, 44(3), 24-27.

Inagaki, K. (1992). Piagetian and post-Piagetian conceptions of development and their implications for science education in early childhood. Early Childhood Research Quarterly, 7(1), 115-133.

Johnson, B. E. (1991). An education of the imagination: Expanding the world of children living in poverty. Journal of Instructional Psychology, 18(3),

174-177.

Laney, J. D. (1989). Experience and concept-label-types effects on first-graders' learning, retention of economic concepts. Journal of Educational Research, 84(4), 231-236.

Maria, K. (1989). Developing disadvantaged children's background knowledge interactively. The Reading Teacher, 42(4), 296-300.

Page, M. (1990). Active learning: Historical and contemporary perspectives. Unpublished doctoral dissertation, University of Massachusetts, Massachusetts.

Petty, C. A. (1988). Early childhood: 3-D Potpourri. Science and Children, 25(7), 32-34.

Pramling, I. (1991). Learning about "The Shop": An approach to learning in preschool. Early Childhood Research Quarterly, 6(2), 151-166.

Renner, J. W., Stafford, D. G., Lawson, A. E., McKinnon, J. W., Friot, F. E., & Kellogg, D. H. (1976). Research, teaching, and learning with the Piaget model. Norman, Oklahoma: University of Oklahoma Press.

Stomfay, S., & Aline, M. (1991, March). Children's literature favorites: Using the five senses. Paper presented at the Annual Conference of the Southern Association on Children under Six, Atlanta, GA.

Wassermann, S. (1990). Teaching strategies. Childhood Education, 66(4), 250-252.

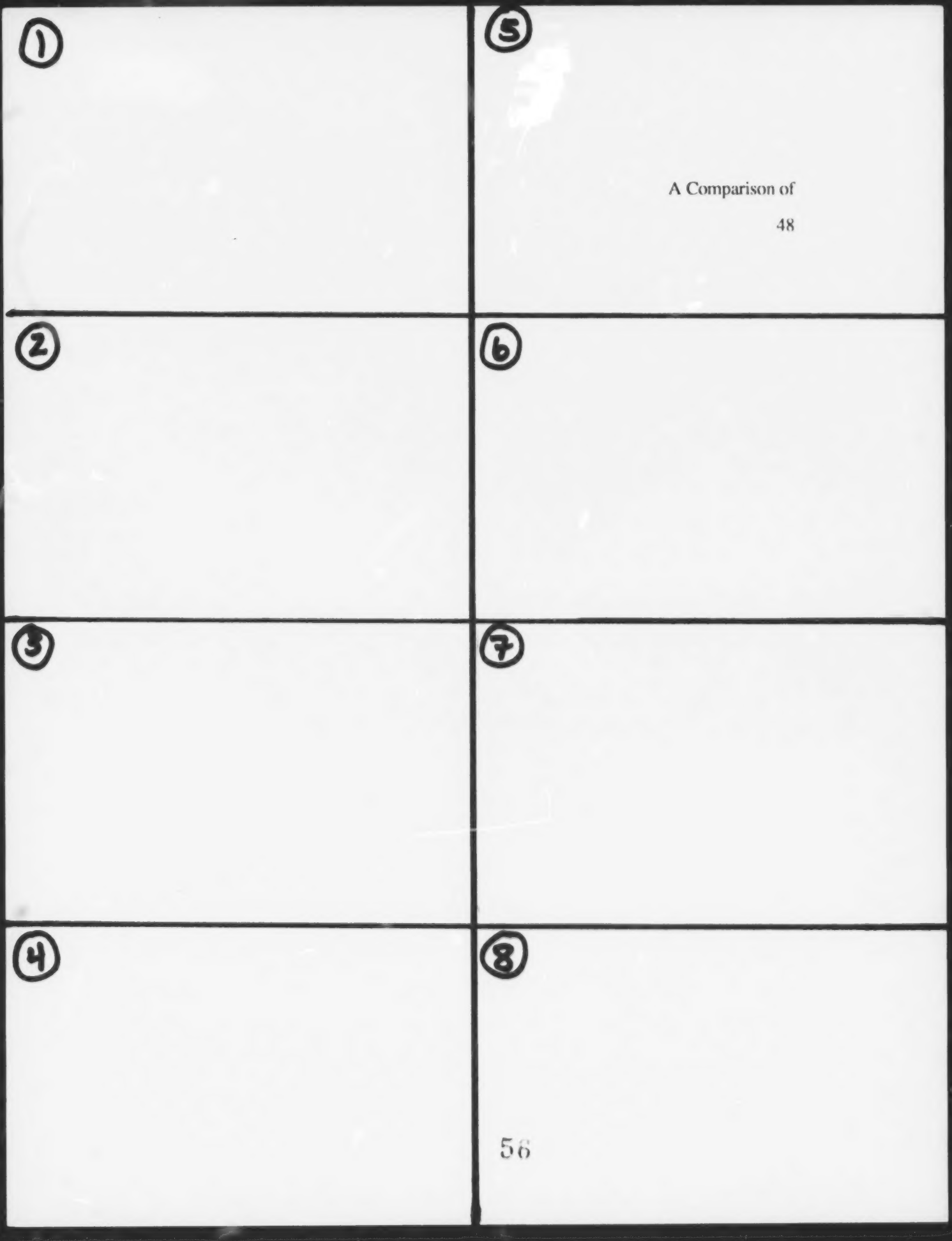
Williams, C. & Kamii, C. (1986). How do young children learn by handling objects? Young Children, 42(1), 23-26.

Worden, T. W. & Franklin, M. R. (1987). Adapting tutorial techniques to perceptual modalities of deficient readers. Educational Research Quarterly, 11(1), 40-48.

Yerkes, R. (1988). What about the young child? Journal of Experiential Education, 11(2), 21-25.

APPENDIX A: PRETEST DATA SHEET

Example on following page.


1
5
A Comparison of
48
2
6
3
7
4
8
56

APPENDIX B: POSTTEST DATA SHEET

See example on following page.

1

2

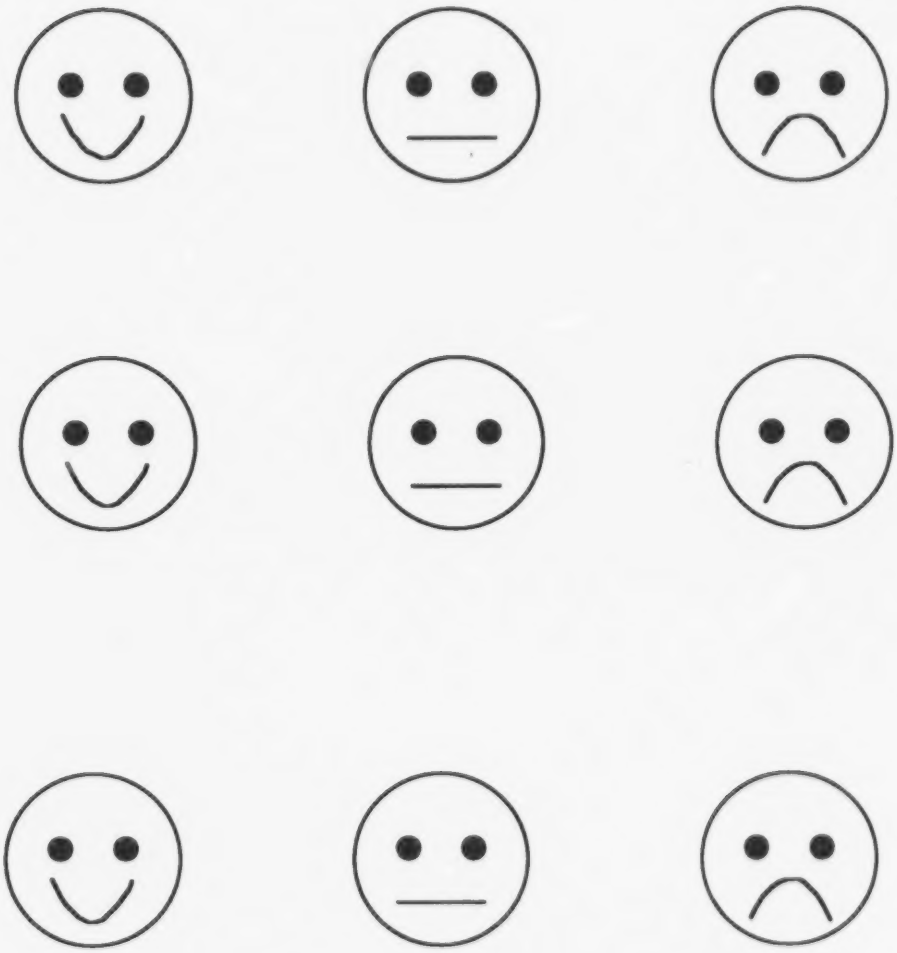
3

A Comparison of

50

4

APPENDIX C: FACES DATA SHEET



APPENDIX D: LESSON PLAN

Objective: To learn about three exotic fruits (kumquat, cherimoya, and cactus pear), and be able to draw them and understand their basic concept.

Materials:

Verbal lesson:

* Big pad of paper, permanent black marker

2-D lesson:

* Big pad of paper, permanent black marker
* One pictorial representation of each fruit

3-D lesson:

* Big pad of paper, permanent black marker
* Plastic garbage bags
* Sponge
* Plastic spoons and knives
* Large paper towel roll
* Enough of each fruit for students to participate

Lesson:

Set behavioral objectives:

(1) Remind students that I am familiar with the classroom discipline procedure of green, yellow and red lights.

(2) Discuss listening, raising hands, paying attention.

Introduction:

(1) Today we are going to learn about three exotic fruit. Can anyone tell me what, "Exotic" means?

(a) Write responses on big pad

(b) Give the definition I found in the Webster's dictionary: "Introduced from a foreign country; not native to the place where found."

(c) Have students give some examples of foreign countries where exotic fruit can come from; write them on the big paper.

(d) Who can give me an example of regular fruit? Write them on the big paper.

Main Body:

(1) The first fruit we are going to learn about is called a kumquat; write the word on the big paper, and have the students pronounce the word.

(a) The word is Cantonese, this means it comes from China, and it means, "Golden orange."

(b) It is a tiny citrus fruit (talk about what a citrus fruit is, and have the

children name some; write them on the big paper).

(c) It is used aS a decoration and as a food.

(d) Some times people put it in syrup. It can be eaten like a grape or an orange.

(e) The outside is sweet and tastes like an orange. The inside is sour and tastes like a lemon.

(f) It looks like a tiny orange.

(g) It has good vitamins.

(2) The second fruit we are going to learn about is called a cherimoya; write the word on the big paper, and have the students pronounce the word.

(a) The cherimoya is from South America, and the word means, "Custard Apple."

(b) It is one of the oldest fruits found in the New World.

(c) It is shaped like a pinecone, and has bumpy skin.

(d) It is silky-smooth cream colored inside of the cherimoya.

(e) It tastes like a mix of pineapple, mango, and papaya.

(f) It had large seeds that are black, and look like watermelon seeds.

(g) It is greenish-yellow until it is ripe, and then it is a dark greenish-brown-black color.

(3) The third fruit we are going to learn about is called a cactus pear; write the word on the big paper, and have the students pronounce the word.

(a) The cactus pear is found in the desert on a Nopal cactus plant.

(b) It is small and oval, and its skin is a mix of green and red colors.

(c) It has spines that stick out of its skin, but they are pulled out before it gets to the grocery store.

(d) The fruit is really sweet, and it tastes kind of like a watermelon.

(e) This fruit is sometimes called a, "Prickly pear."

(f) The inside is a bright reddish-purple color with little tiny black seeds.

Conclusions:

(1) Ask students to recall what we learned about the kumquat.

(2) Ask students to recall what we learned about the cherimoya.

(3) Ask students to recall what we learned about the cactus pear.

(4) Ask students if there are any questions.

APPENDIX E: OUTLINE OF PRETEST FORMAT

Time: 12:45 - 2:30

Weather: Sunny, mid 40's

Order of Pictures to be Drawn:

(1) Apple
(2) Kumquat
(3) Pepino Melon
(4) Passion Fruit
(5) Starfruit
(6) Cherimoya
(7) Pomegranate
(8) Cactus Pear

Format:

(1) Drawing Fruit:

Hi _____!

You are going to be drawing some pictures of fruit. You can use only one color of crayon in each box, so you have to choose the major color in the fruit. O.K.? We need to draw quickly. If you do not know what the fruit is, then just do your best, and draw what you think the fruit looks like. O.K.? Let's do an example.

(a) In square one, draw an apple. Now, what color will you use? (The child should respond, "Red.") Now praise the child and ask them if they understand or have any other questions.

(b) Go through the other seven fruit. Simple say the fruit, and then wait. No clues, or the like will be given.

(2) Faces Self-Evaluation Strip:

Tell the student that I am going to close my eyes now, and that they need to listen and follow directions.

(a) Hand the student the strip of faces, and then cover my eyes. Ask them if they can hear me.

(b) Take a blue crayon. Circle the face that shows how much you knew about the fruit you just drew. Tell me when you are done.

(c) Now take a red crayon. Circle the face that shows how good you will be able to draw the fruit after we learn about them. Tell me when you are done.

(d) Now, hide that paper anywhere you want to in that pile (there is only one pile there) and tell me when you are done so I can uncover my eyes.

(e) Thank the student, and tell them how wonderful of a job they did. Let them choose a sticker, and then send them back to class to "tap" the next child to come out.

APPENDIX F: OUTLINE OF POSTTEST FORMAT

Time: 10:15 - 11:15 (three consecutive days)

Weather: First day: Sunny, low 40's

Second day: Partially cloudy, low 40's

Third day: Partially cloudy, mid 40's

Order of Pictures to be Drawn:

(1) Banana

(2) Kumquat

(3) Cherimoya

(4) Cactus Pear

Format:

(1) Drawing Fruit:

Hi _____!

You are going to be drawing some pictures of fruit. You can use any colors of crayons that you want to use. O.K.? We need to draw quickly. If you do not know what the fruit is, then just do your best, and draw what you think the fruit looks like. O.K.? Let's do an example.

(a) In square one, draw a banana. Now praise the child and ask them if

they understand or have any other questions.

(b) Go through the other three fruit. Simple say the fruit, and then wait. No clues, or the like will be given.

(2) Faces Self-Evaluation Strip:

Tell the student that I am going to close my eyes now, and that they need to listen and follow directions.

(a) Hand the student the strip of faces, and then cover my eyes. Ask them if they can hear me.

(b) Tell the child: "Take a blue crayon. Circle the face that shows how much you knew about the fruit you just drew. Tell me when you are done."

(c) Now, hide that paper anywhere you want to in that pile (there is only one pile there) and tell me when you are done so I can uncover my eyes.

(3) Testing Other Concepts of the Fruit:

Tell the students the following story, "I have lost all of my papers and notes, and I need your help to remember what the fruits look like. Tonight I am going to go the grocery store to but a _____. How am I going to know it when I see one?

Go through the following list of questions:

(a) What does it look like?

(b) What does it feel like?

(c) How big/small and/or heavy/light is it?

(d) What does it smell like?

(e) What does the inside look like?

(f) What does it taste like?

(g) Is there anything else you can tell me to help me find it in the store?

Go through this sequence with all three fruit in the same order that I asked the students to draw them: Kumquat; cherimoya; and, cactus pear.

(f) Thank the student, and tell him/her how wonderful of a job they did. Let him/her choose a sticker, and then send the student back to class to "tap" the next child to come out.